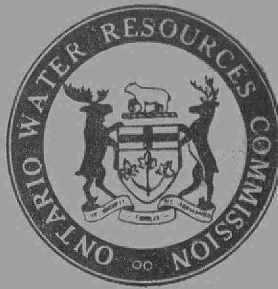


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O. W. R. C.
Water Pollution
Survey

THE
ONTARIO WATER RESOURCES
COMMISSION

WATER POLLUTION SURVEY

of the

VILLAGE OF HAVELOCK

COUNTY OF PETERBOROUGH



1969

H-13-18

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1969
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REPORT
on a
WATER POLLUTION SURVEY
of the
VILLAGE OF HAVELOCK
in the
COUNTY OF PETERBOROUGH

1969
DISTRICT ENGINEERS BRANCH
DIVISION OF SANITARY ENGINEERING

WATER POLLUTION SURVEY

of the

VILLAGE OF HAVELOCK

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REPORT ON A WATER POLLUTION SURVEY

of the

VILLAGE OF HAVELOCK

in the

COUNTY OF PETERBOROUGH

INTRODUCTION

A water pollution survey of the Village of Havelock was conducted during the fall of 1969 by Commission staff. Surveys of this type are made by the Ontario Water Resources Commission to determine existing and potential sources of water pollution. Recommendations are made concerning methods for controlling the sources of pollution. A map of Havelock, showing the locations of the sampling points, is appended to this report.

PREVIOUS SURVEY

In July, 1961, a water pollution survey of the Crowe River was conducted by Commission staff. Included in that report was a sanitary survey of the Village of Havelock. The report indicated that sanitary wastes were gaining access to the improved watercourse in Havelock which discharges to Plato Creek. The following recommendation was made:

"Officials of the Village of Havelock should ensure that all untreated or inadequately treated wastes are excluded from the flows which discharge from this municipality to Plato Creek."

INTERVIEWS WITH OFFICIALS

Discussions were held with the following officials:

Mr. J. C. Carruthers, Chief Public Health Inspector
Mrs. D. A. McMillen, Village Clerk, Havelock
Mr. E. J. Leeson, Reeve, Havelock
Mr. G. Miles, Water Works Operator, Havelock

GENERAL

Havelock is located near the junction of Highway #7 and Highway #30, approximately 25 miles east of the City of Peterborough. The Village is a division point on the Canadian Pacific Railway line from Toronto to Ottawa. The municipality has a population of 1,214 persons and covers an area of 431 acres.

Plato Creek flows through the southern section of the Town in an easterly direction. The creek then flows in a north-easterly direction and eventually discharges into Crowe Lake.

WATER SUPPLY

The construction of Havelock's municipal water works was made with the assistance of the Ontario Water Resources Commission. The system presently consists of two drilled wells. The first well was constructed in 1958 and it supplies water to the distribution system without prior treatment. Due to a depletion in the capacity of the well, a second well was constructed. This new well was completed in 1968 and the water from it is chlorinated prior to entering the distribution system.

A steel standpipe provides a water storage capacity of 150,000 gallons. The system presently serves approximately 250 families.

A routine inspection of this water works was made on September 18, 1969, by Commission staff. The water quality was found to be generally satisfactory at this time.

INDUSTRY

An industrial wastes survey of the Havelock Creamery was conducted by the Commission on February 9, 1968. It was found that contaminated wastes were being discharged to the municipal watercourse and recommendations concerning the abatement of this pollution were made. However, it was reported that the Creamery closed down during December 1968.

Smith's Dairy, located beside the fair ground in Havelock, was reported to no longer process any milk. Milk is apparently trucked in from Peterborough, and the Dairy acts as a distribution centre.

Therefore, there is presently no industry with a wet process in Havelock. There is only residential and moderate retail commercial development in the municipality.

SURFACE WATER DRAINAGE

A small watercourse, having its source in a marshy area at the western end of the village, flows in an easterly direction as indicated on the appended map. This waterway

is enclosed until it reaches Highway #7. Systems of storm drains in Havelock are directed to this watercourse.

Another small watercourse meets this improved watercourse in the east part of the Town. Portions of this small watercourse are also tiled. The combined flow discharges to Plato Creek.

The combined flow in this local watercourse was determined on December 2, 1969. The velocity of the flow was determined by the use of an Ott-Meter and the cross-sectional area was measured at the same point. Then by using appropriate conversion factors and the following formula,

$$\text{Flow} = \text{Velocity} \times \text{Area},$$

the flow was determined. It was calculated that the flow was in the order of 110,000 gallons per day at this time.

SEWAGE DISPOSAL

Since there is no municipal sewage works in Havelock, sewage disposal is accomplished on an individual basis by the use of private sub-surface disposal systems. New sewage disposal systems are inspected by the staff of the Peterborough County-City Health Unit.

It is noted that the provincial sewage works programme proposed has been held in abeyance since the proposed rates were turned down by the Council on April 9, 1969. Methods for financing sewage and water works programmes are outlined in

Appendix B of this report. It should be noted that a new programme of financial assistance has been developed and this is outlined in Appendix B under "Provincially-Owned Works." This new programme would reduce the typical home charge of a sewage works for Havelock.

SAMPLING PROCEDURE

Sampling runs were made on May 22, 1968, September 6, 1968 and May 8, 1969 by Commission staff to determine the quality of the water in Plato Creek upstream and downstream of Havelock. The upstream sampling point is shown on the appended map but the two downstream locations are not shown. The first of these points is at Plato Creek and Highway #7, approximately two miles downstream of Havelock. The other sampling point was at Plato Creek and Freeman Corners, approximately seven miles downstream of Havelock.

During this survey samples were taken from pertinent locations within the municipality and all of these points are shown on the appended map.

The results of all the samples taken and an interpretation of the various analysis employed are given in Appendix C of this report.

SAMPLE RESULTS

The sample results indicate that untreated or inadequately treated sanitary wastes are still gaining access to the

watercourse in the municipality. The water in this ditch was of poor sanitary chemical quality and the coliform level was very high, therefore displaying its ability to impair the quality of the waters of Plato Creek.

DISCUSSION

It appears that there has been little improvement in the quality of the water in the ditch since the 1961 report. The recommendation of that report, therefore, is still outstanding and is repeated in this report. This recommendation states that:

"Officials of the Village of Havelock should ensure that all untreated or inadequately treated wastes are excluded from the flows which discharge from this municipality to Plato Creek."

There appears to be two possible solutions to this pollution problem. The implementation of a sewage works programme would rectify this situation or there is the possibility that the problem may be solved on an individual basis. This second solution involves the correction of all inadequate disposal systems on a house to house basis.

It was reported that Havelock was built in a swampy area. This would indicate that the ground in the municipality would contain a relatively high amount of water. This excessive

amount of water would tend to interfere with the successful operation of sub-surface disposal systems. Therefore correction of the pollution problem on an individual basis could prove very difficult if not impossible.

It should also be realized that the continued absence of a communal sewage works system will likely continue to impose some limitation on certain types of future development in Havelock.

Graphs showing the populations in Havelock and the percentage of the county population in Havelock since 1911 are shown in Appendix A, Tables I and II, respectively. The figures were taken from the Dominion Bureau of Statistics records. It is noted that there has been little numerical change in the population of Havelock since 1911. However, the percentage of the population of the County of Peterborough who reside in Havelock, has steadily decreased since 1911. The provision of a sewage works system could possibly promote development and therefore reverse this trend.

SUMMARY

A water pollution survey of the Village of Havelock was conducted during the fall of 1969. This survey revealed that unsatisfactorily treated sanitary wastes were still gaining access to the watercourse. The most satisfactory solution to this problem would appear to be the implementation of a sewage works programme.

A similar recommendation, to that made in the 1961 report, concerning the abatement of water pollution in Havelock, is made in this report.

RECOMMENDATION

The Council of the Village of Havelock should ensure that all contaminated waste discharges to drainage courses and thence to Plato Creek are eliminated.

Prepared By:

F. Burford
F. Burford,
Engineer's Assistant,
Division of Sanitary Engineering.

dlf

APPENDIX A
VILLAGE OF HAVELOCK - POPULATION STATISTICS

TABLE I

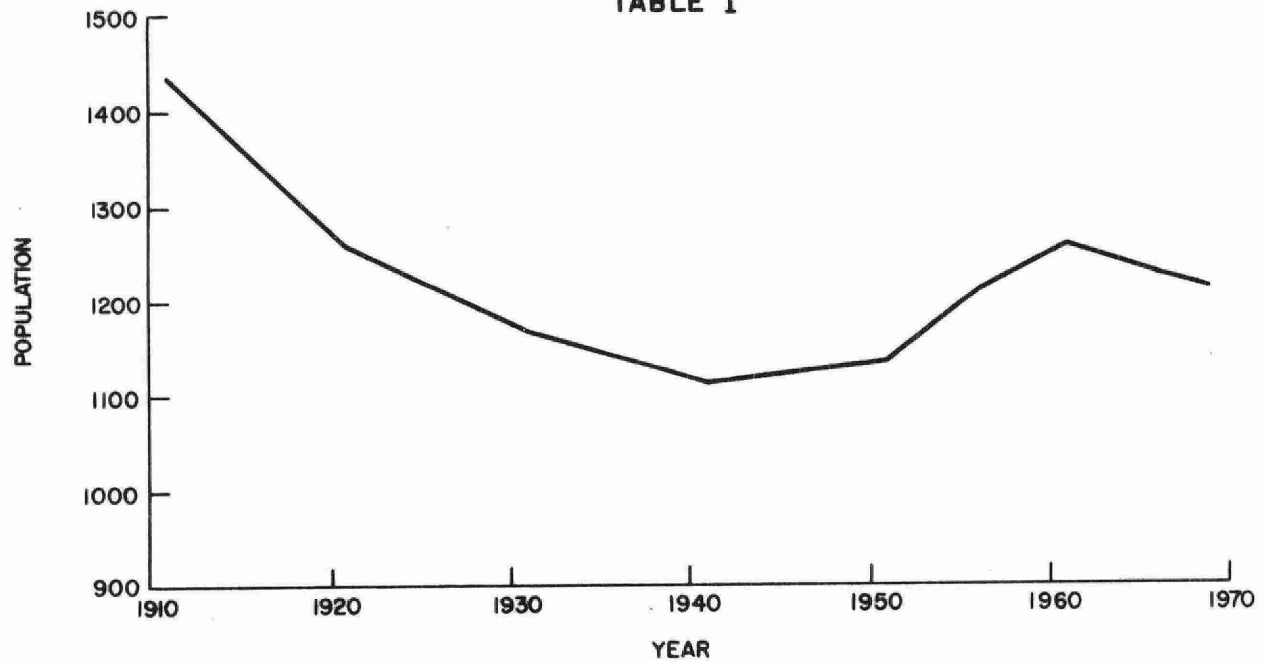
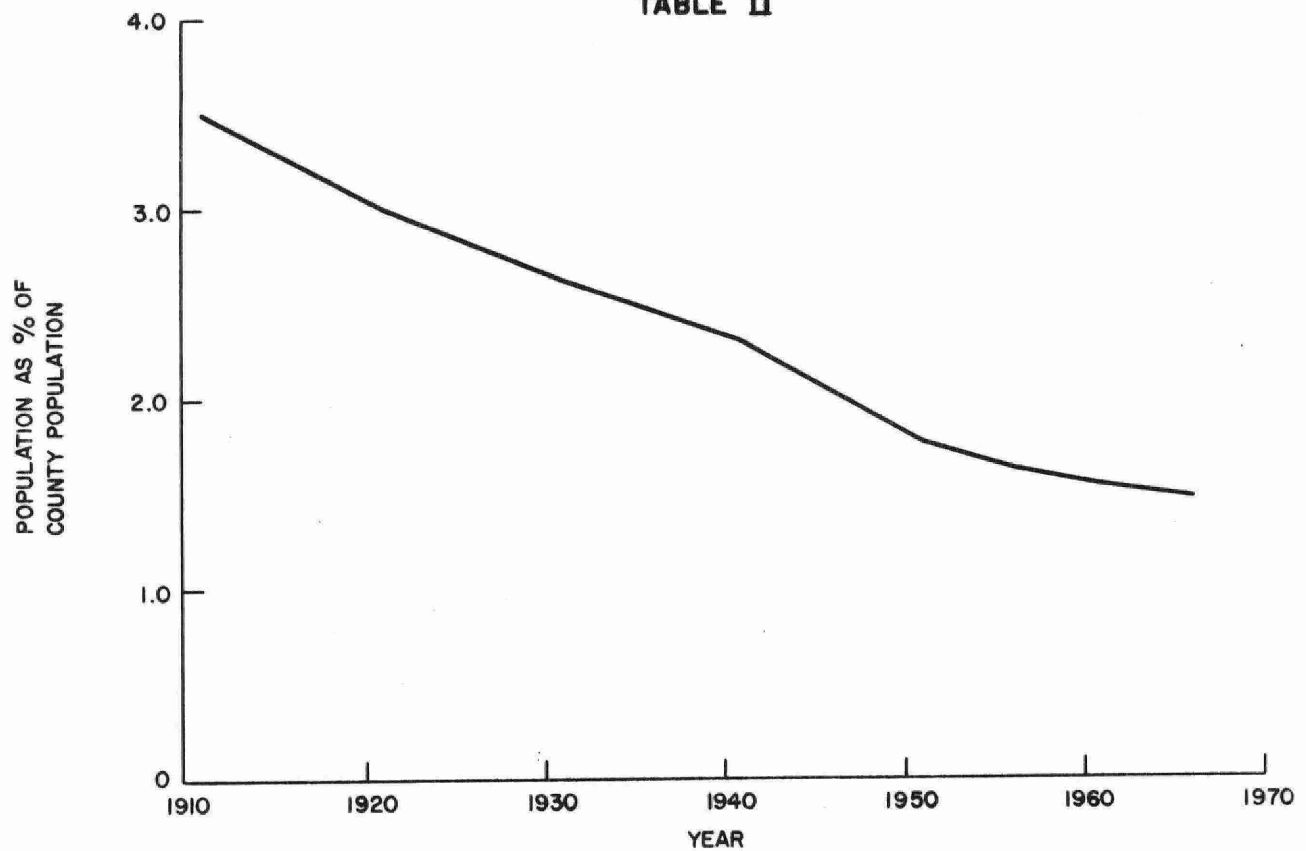


TABLE II



APPENDIX B

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMMES

Currently, there are three general methods which may be utilized for implementing sewage and water works programmes. These are: 1) to enter into an agreement with the Ontario Water Resources Commission for the construction of the treatment and collector works with an obligation to pay the debt retirement and operating charges over the term of the agreement with the facility reverting to the municipality at the end of the term of the agreement, 2) by requesting the provision of service from a Provincially-owned project, and 3) by proceeding with the construction independently and meeting capital costs by the sale of debentures.

OWRC/MUNICIPAL PROJECTS

For the construction of water and sewage works under agreement with this Commission, the works are provided and developed under Sections 39 to 46 of the Ontario Water Resources Commission Act.

For this type of arrangement, the Commission utilizes a sinking fund and consequently the annual payments are based on a specific debt retirement period and the payments are unchanged for the period of the agreement. This type of project may be financed over a period of time up to a maximum of 30 years. The annual charges for projects constructed under this agreement are determined as follows:

1. Capital Repayment

As noted, OWRC financing is by the sinking fund method and an annual payment of approximately two percent of the capital cost is required to retire a debt over a 30-year period.

2. Interest

On new Commission projects, interest is calculated at the current rate.

3. Reserve Fund

To provide money for repairs and replacements, Section 40 of the Ontario Water Resources Commission Act provides for the establishment of a reserve fund by the Commission. It is important to note that this fund is established in the name of the municipality and the balance consequently earns interest. It has now been established by Commission minute that the reserve fund reaches an amount of ten times the initial annual billing and the reserve fund billing shall be re-imposed only when the fund has been depleted to 80 percent or less of the maximum amount.

4. Operating Costs

Under OWRC agreement, the municipality is responsible only for the operating costs directly attributed to the project in the municipality. Therefore, no charges are made by the Commission for the services of

head office personnel who are available as required to advise on the satisfactory operation and maintenance of the project.

PROVINCIALY-OWNED WORKS

In June, 1967, the Honourable J. R. Simonett, Minister of Energy and Resources Management, made an announcement which expanded the authorization of this Commission for the provision of water supply and sewage treatment facilities. This new programme allows the Commission to construct entire water and sewage works facilities for small municipalities. The capital costs of these can be amortized over a 40-year period.

On October 16, 1969, the Honourable George A. Kerr, Q.C., the new Minister of Energy and Resources Management, announced a new programme of financial assistance to help municipalities initiating new sewage and water works projects. This new programme will assist small municipalities with high cost projects due to topography or those with a small population and low assessment who would otherwise be unable to afford it. Under this new programme sufficient provincial assistance will be provided to ensure that in most cases the cost of sewage works and water works in a municipality will not exceed an average home charge of \$120.00 and \$100.00 per year respectively. In some cases, where the costs are exceptionally high, the maximum contribution by the province will be 50 percent of the total cost.

Therefore, it is possible that in certain exceptionally high cost projects that the typical home charges of \$120.00 and \$100.00 for sewage and water respectively, may be exceeded. In these cases, however, the home charge should still be substantially lower than the home charge incurred by previous methods of financing.

A slight variation of this programme could be implemented in that the municipality may request that this Commission provide only the major water and sewage works facilities as Provincially-owned works, and develop the water distribution and sewage collector systems under the standard type of Commission project. It would appear that where applicable, it would be more advantageous for the municipality to proceed on the basis of requesting this Commission to develop entire systems as Provincially-owned works.

The municipal portion of the associated cost of supplying these works, including amortization of capital costs, together with operating and maintenance charges, will be recovered by the sale of service to the affected municipalities by rates determined on a usage basis. These facilities will be wholly-owned by the Province of Ontario and the arrangements for service will be formalized by contracts between the Commission and the municipality concerned. The installations will be operated

entirely at cost with appropriate provision for adjustment in rate.

DEVELOPMENT

If a municipality, after considering the alternatives, wishes this Commission to consider Provincially-financed projects, application forms should be completed and submitted together with a resolution of the Municipal council. A draft of the suggested wording of the resolution is included with the application forms.

If the proposed works are to be built by the municipality on its own initiative or as a formal project under agreement with this Commission, it is required that the Council retain a consulting engineer to prepare preliminary engineering reports on the proposed work. If a Provincial system is contemplated, no action should be taken with respect to retaining a consulting engineering firm as the Commission will designate a consulting engineer to carry out the Provincial portion of the work and it would be advantageous if the municipal portion be studied and reported on by the same engineer.

APPENDIX C

SIGNIFICANCE OF LABORATORY ANALYSES

Bacteriological Examination

The presence of coliform indicates pollution from human or animal excrement, or from some non-faecal forms. The objective for surface water quality in Ontario is a maximum of 2400 organisms per 100 millilitres.

The OWRC Laboratories employ the Membrane Filter (MF) technique of examination to obtain a direct enumeration of coliform organisms. The Department of Health Laboratories use the Most Probable Number (MPN) enumeration and coliform counts are reported as Total Coliform Organisms (TC) and Faecal Coliform Organisms (FC).

Sanitary Chemical Analyses

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is reported in parts per million (ppm) and is an indication of the amount of oxygen required for the stabilization of decomposable organic or chemical matter in water. The completion of the laboratory test requires five days, under the controlled incubation temperature of 20° Centigrade.

The OWRC objective for surface water quality is an upper limit of four (4) ppm.

Solids

The value for solids, expressed in parts per million (ppm) is the sum of the values for the suspended and the dissolved matter in the water. The concentration of suspended solids is generally the most significant of the solids analyses with regard to surface water quality.

The effects of suspended solids in water are reflected in difficulties associated with water purification, depositions in streams and injury to the habitat of fish. Where suspended solids values are less than 20 ppm, laboratory difficulties are experienced and the turbidity is determined instead.

Nitrogen

Ammonia Nitrogen (Free Ammonia) is the soluble product in the decomposition of nitrogenous organic matter. It is also formed when nitrates and nitrites are reduced to ammonia either biologically or chemically. Some small amount of ammonia, too, may be swept out of the atmosphere by rain water.

The following values may be of general significance in appraising free ammonia content: Low 0.015 to 0.03; moderate 0.03 to 0.10 ppm; high 0.10 or greater.

Total Kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia gives a measure of the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

Nitrite Nitrogen

Nitrite is usually an intermediate oxidation product of ammonia. The significance of nitrites, therefore, varies with their amount, source and relation to other constituents of the sample, notably the relative magnitude of ammonia and nitrate present. Since nitrite is rapidly and easily converted to nitrate, its presence in concentrations greater than a few thousandths of a part per million is generally indicative of active biological processes in water.

Nitrate Nitrogen

Nitrate is the end product of aerobic decomposition of nitrogenous matter, and its presence carries this significance. Nitrate concentration is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

The following ranges in concentration may be used as a guide. Low, less than 0.1 ppm; moderate, 0.1 to 1.0 ppm; high, greater than 1.0 ppm.

Phosphorus

Total Phosphorus

Total Phosphorus is a measure of both the organic and inorganic forms of phosphorus present.

Soluble Phosphorus

Soluble Phosphorus is a measure of the orthophosphate only and when subtracted from the total phosphorus given an indication of the concentration of organic phosphorus present. That is, the soluble phosphorus is a measure in the form of polyphosphate, which, however, in surface waters is usually insignificant. Inorganic phosphorus in concentration in excess of 0.01 ppm may cause nuisance conditions.

Anionic Detergents (ABS)

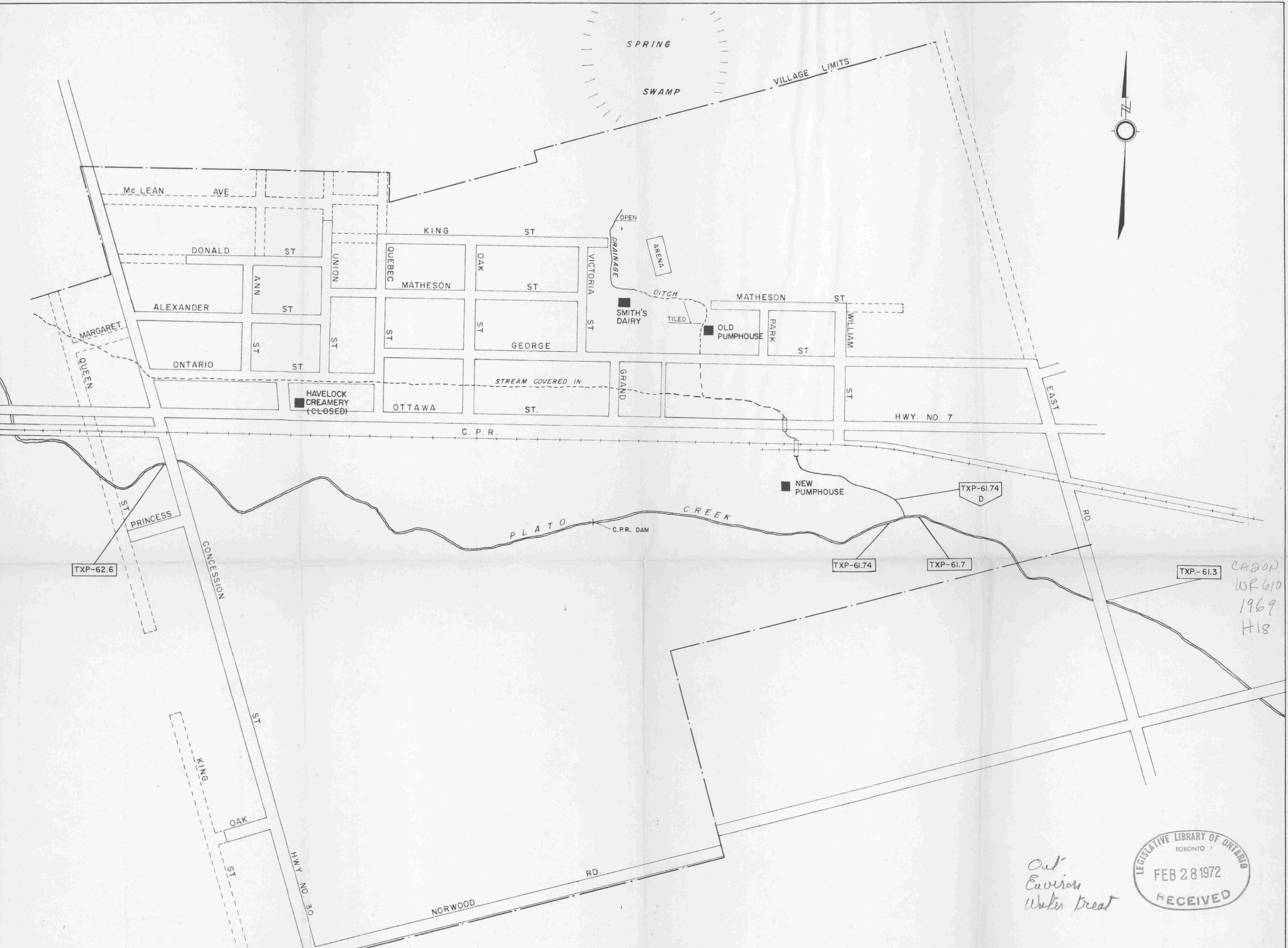
The presence of anionic detergents as ABS is an indication that domestic waste is present.

VILLAGE OF HAVELOCK

WATER POLLUTION SURVEY

SAMPLING POINT NO.	DESCRIPTION OF SAMPLING POINTS	DATE	5-DAY BOD	S O L I D S			N I T R O G E N A S N				P H O S P H O R U S A S P		ANIONIC DETER- GENTS AS ABS	BACTERIOLOGICAL EXAMINATION	
				TOTAL	SUSP.	DISS.	FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	TOTAL	SOLUBLE		TOTAL	FAECAL
TXP 62.6	PLATO CREEK - UPSTREAM OF HAVELOCK	MAY 22/68	0.7	268	1	267	0.21	0.73	.003	.039			0.2	110	
		SEPT. 6/68	1.4	334	4	330	0.08	0.74	.008	.01	0.13		0.0		
		MAY 8/68	1.0	220	1	219	0.03	0.41	.006	.23	0.02		0.1	2,050	200
		SEPT. 18/68	0.6	400	5	395	0.04	0.60	.018	1.8	0.02	0.01	0.1	100	40
		OCT. 9/69	0.4	300	5	295	0.03	0.46	.004	.01	0.02	< 0.01	0	140	64
		DEC. 2/69												40	28
TXP 51.74	PLATO CREEK - 30 FEET UPSTREAM OF HAVELOCK DITCH	DEC. 2/69												125	96
TXP 51.74 D	DITCH TO PLATO CREEK	SEPT. 18/69	3.0	510	10	500	1.9	2.6	0.21	3.5	0.80	0.63	0.5	240,000+	240,000+
		OCT. 9/69	3.0	570	15	555	1.3	1.9	0.34	1.7	0.80	0.70	0.2	140,000	3,100
		DEC. 2/69												35,000	14,000
TXP 51.7	PLATO CREEK - 30 FEET DOWNSTREAM OF HAVELOCK DITCH	DEC. 2/69												4,000	500
TXP 51.3	PLATO CREEK - DOWNSTREAM OF HAVELOCK	SEPT. 18/69	1.0	400	5	395	0.04	0.60	.018	1.8	0.08	0.06	0.1	80+	80+
		OCT. 9/69	0.6	420	10	410	0.06	0.38	.015	1.2	0.01	0.04	0	740	80
		DEC. 2/69												1,800	400
TXP 59.3	PLATO CREEK - TWO MILES DOWNSTREAM OF HAVELOCK	MAY 22/68	1.1	284	3	281	0.24	1.00	.006	.104			1.1	830	
		SEPT. 6/69	1.0	320	37	283	0.09	0.92	.017	.40	0.43		0.0		
		MAY 8/69	1.2	250	5	245	0.05	0.44	.007	.25	0.02		0.1	4,100	2,000
TXP 54.5	PLATO CREEK - AT FREEMAN CORNERS	MAY 22/68	1.3	266	2	264	0.04	1.00	.039	.061			0.2	350	
		SEPT. 6/68	1.6	322	19	303	0.09	.76	.010	.06	0.22	.	0.0		
		MAY 8/69	1.4	220	5	215	0.02	.48	.006	.06	0.03		0.0	180	72

- NOTES:
1. ALL ANALYSIS IN PPM
 2. BACTERIOLOGICAL EXAMINATIONS CONSIST OF COLIFORM ORGANISMS PER 100 ML



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LEGEND

- TXP. 62.6 SAMPLING POINT SHOWING STREAM AND MILEAGE
- TXP. 61.9 STREAM AND MILEAGE AT OUTFALL
- D TYPE OF OUTFALL
- OUTFALL
- D OPEN DRAIN OR DITCH
- WATERCOURSE OPEN
- - - WATERCOURSE COVERED

ONTARIO WATER RESOURCES COMMISSION	
VILLAGE OF HAVELOCK	
WATER POLLUTION SURVEY	
1969	
SCALE 0 200 400 600 800 1000'	
DRAWN BY: J. H.	DATE: APRIL, 1961
CHECKED BY:	DRAWING NO: 61-24



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